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Green Infrastructure:
A Strategic Approach To Land Conservation

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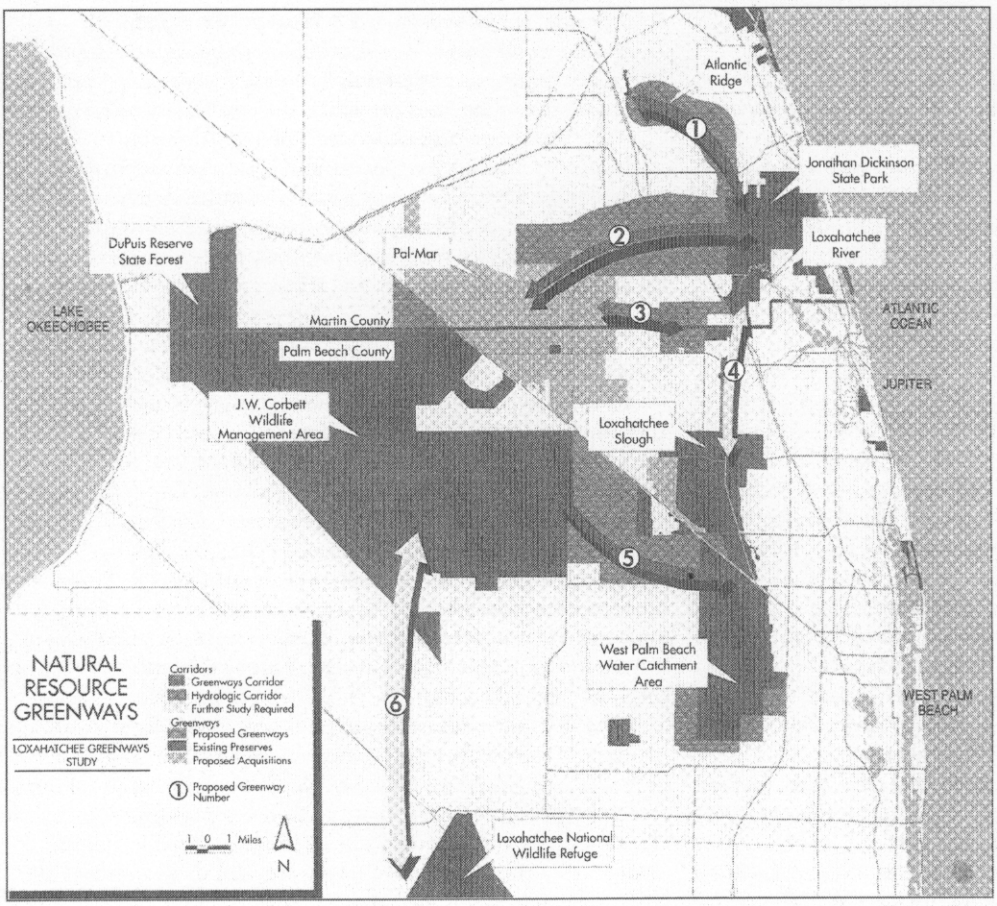

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WHY UNDERTAKE GREEN INFRASTRUCTURE INITIATIVES?

Green infrastructure provides a logical, scientific-based framework that:

- helps guide and integrate the conservation actions of diverse people, organizations, and agencies while promoting smart growth and smart conservation at all scales;
- recognizes and addresses both natural and human needs, enabling us to think strategically with respect to multiple purposes and values;
- helps provide conservation certainty for communities and regions facing dramatic, growth-related changes as well as development certainty for private property owners and commercial interests; and
- provides a broad, unifying vision for the future that people and organizations with diverse background and interests can buy into.

Green infrastructure is our nation's natural life support system, an interconnected network of natural areas, conservation lands, and working landscapes that support native species, maintain natural ecological processes, sustain air and water resources, and contribute to the health and quality of life for America's communities and people. This *PAS Memo* introduces green infrastructure as a strategic approach for land conservation and provides eight guiding principles for successful green infrastructure initiatives.

America's Land Conservation Challenge

The accelerated consumption and conversion of open land is America's number one land conservation challenge and a top issue faced by government officials and planners. In our metropolitan areas, the consumption and conversion of land has been particularly dramatic. For example, between 1970 and 1990, Cook County, Illinois, and the five other counties closest to Chicago experienced a 33 percent increase in developed land, but the population increased by only four percent. Over the same period, more than 450 square miles of agricultural land was converted to residential and employment uses, according to *The Biodiversity Recovery Plan*, published in September 1999 by Chicago Wilderness.

The conversion of natural areas and farmland has resulted in increased habitat fragmentation, loss of biodiversity and wildlife populations, disruption of natural landscape processes, impairment of carbon storage, and the degradation of air and water resources. It has also had numerous social consequences, including the loss of vital services provided by natural systems, such as stormwater retention and filtration of pollutants, increased public and private costs of providing services to dispersed development, and the loss of the connection people feel with nature and with each other.

To address these concerns, national, state, and local governments have developed a variety of location- and goal-specific programs, policies, and plans for resource conservation, species protection, air- and water-quality management, land management, and park development. Communities are investing in parks, open space, farmland and forest protection, and other elements of green space.

Although current policies and programs have achieved much toward protecting natural systems and processes and improving environmental quality, important objectives still go unmet. One conclusion is that a patchwork of well-intentioned resource conservation approaches is insufficient to arrest the decline of species, native systems, and natural ecological processes, or to dispel the feeling that we are losing our quality of life as a result of continued growth beyond city or county boundaries.

The American public recognizes this conservation challenge. According to an October 1999 poll sponsored by the Pew Center for Civic Journalism, for the first time Americans rate sprawl and traffic equal to or greater than crime and violence as the top problems facing communities. On the local level, when asked to name "the most important problem facing the community where you live," 18 percent of respondents cited sprawl and traffic as their top concern—the same percentage as those citing crime. For those living in suburban areas, the portion of respondents who think sprawl is their community's worst problem jumps to 26 percent—higher than crime or any other issue.

Bringing "Smart Conservation" to Community Development

Sprawl and the associated consumption of open land for residential and commercial development are causing widespread concern in America's communities. For many the problem is not growth itself, but the patterns of growth. Where do we put it? How do we arrange it? How does it fit into the area's ecological, social, cultural, and economic landscape? Simply put, it's better to develop some places than other places. Over the last decade "smart growth" has emerged as a key tool to strategically direct and influence the pattern of growth and land development. Increasingly, governors and legislators are calling for smart growth laws and programs to be adopted.

As communities need to address haphazard development, they also need to address haphazard conservation—conservation activities that are reactive, site-specific, narrowly focused, and/or not well integrated with other efforts. To strategically direct our nation's conservation practices, we need "smart conservation," which promotes resource planning, protection, and management activities that are proactive, systematic, holistic, multi-functional, and multi-scale.

In its May 1999 report, *Towards a Sustainable America*, the President's Council on Sustainable Development identified green infrastructure as one of five strategic areas that provide a comprehensive approach for sustainable community development. According to the Council's Metropolitan and Rural Strategies Task Force, ". . . many communities are increasingly promoting place-based approaches to conserve, protect, and restore local and regional systems of natural resource amenities. The objectives of these green infrastructure strategies are somewhat different from those of traditional conservation efforts. While traditional conservation focuses on environmental restoration and preservation, it often neglects the pace, shape, and location of development in relationship to important natural resources and amenities. Green infrastructure strategies actively seek to understand, leverage, and value the different ecological, social, and economic functions provided by natural systems in order to guide more efficient and sustainable land use and development patterns as well as protect ecosystems."

America's Natural Life Support System

According to *Webster's New World Dictionary*, infrastructure is "the substructure or underlying foundation, especially the basic installations and facilities on which the continuance and growth of a community or state depends." All over America, communities plan for and invest in the gray infrastructure of roads, utility lines, communications and water systems, and the social infrastructure of schools, hospitals, and libraries. But there is another infrastructure system that needs to be planned for and invested in first—green infrastructure, America's natural life support system.

Green infrastructure is an interconnected network of conserved natural areas and features (including wetlands, woodlands, waterways, and wildlife habitat), public and private conservation lands (including nature preserves, landscape linkages, wildlife corridors, and wilderness areas), private working lands of conservation value (including forests, farms, and ranches) and other protected open spaces (including greenways and parks). It is green space that serves multiple purposes and is strategically planned and managed at the local, regional, and state levels. Green infrastructure supports native species and habitats, maintains natural ecological processes and functions, sustains air and water resources, and contributes to the health and quality of life of America's communities and people.

Green infrastructure planning links the needs for green and gray infrastructure in a more effective, economical, and livable network than would otherwise occur. It ensures that green space and gray space are placed where most needed and most appropriate. In a rural landscape, it identifies vital ecological areas and linkages in advance of growth and development. In built environments, it identifies opportunities for the restoration and enhancement of naturally functioning systems.

A city, county, or state would never build a road, water, or electrical system piece by piece, or engage in redevelopment without advance planning, assurances of public financing, or coordination among different system components and jurisdictions. It is time to do the same for green space.

Green Infrastructure Guiding Principles

States, regions, communities, private landowners, public agencies, and conservation nonprofits across the country are working to conserve and restore our country's natural life support system. These projects go by many different names, such as greenway planning, ecosystem management, conservation development, or habitat restoration. Many of them embody and demonstrate concepts and practices critical to successful green infrastructure initiatives.

In August 1999 the Green Infrastructure Working Group of local, state, and federal government agencies and non-

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governmental organizations was formed with the purpose of developing a training program that would help communities and their partners make green infrastructure an integral part of local, regional, and state plans and decisions.

The working group is currently developing a set of guiding principles for undertaking successful place-based green infrastructure initiatives. These principles, presented below, are still being developed. They are based on the working group's experiences and on observations of green infrastructure initiatives from around the country.

1. Embrace green infrastructure as the framework for conservation. Most of our land conservation programs over the last century have focused on the protection of individual parks, preserves, or other areas of natural resource value. Conservation biology teaches us that these wilderness islands are unlikely to meet their conservation objectives due to the isolation of their wildlife populations and the elimination of essential ecological processes that cross entire landscapes. Gray infrastructure, which often provides the framework for future growth, is planned in advance as a system of interconnected parts. We need to embrace green infrastructure as the framework for conservation. To accomplish this, we need to plan for and protect interconnected green space systems. Where isolated wilderness islands already exist, we need to work to restore the vital ecological connections that are necessary for their survival.

2. Finance the protection and management of green infrastructure as a primary public investment. Gray infrastructure is financed as primary budgetary line items. State and local governments use dedicated gas taxes and other public funding mechanisms to pay for highway planning, rights-of-way acquisition, construction, maintenance, and system improvement. Likewise, we need to finance green infrastructure planning, protection, management, and/or restoration as a priority public investment. States and communities have used a wide variety of funding mechanisms for the protection and maintenance of green infrastructure, including bond referenda, real estate transfer taxes, dedicated development fees, and direct budgetary line items. We need to be innovative in financing our green space systems, using a blend of whatever funding is available. This approach will benefit our green infrastructure and will help reduce the need for and costs of gray infrastructure.

RESOURCES

American Forests:
www.americanforests.org

Chicago Wilderness:
www.chiwild.org

Florida's Statewide Greenways Planning Project:
www.geoplan.ufl.edu/projects/greenways/greenwayindex.html

Florida Department of Environmental Protection Office of Greenways and Trails:
www.dep.state.fl.us/gwt

Green Infrastructure Working Group:
www.greeninfrastructure.net

Keep America Growing:
www.keepamericagrowing.org

Maryland Greenways:
www.dnr.state.md.us/greenways

Resources for Green Infrastructure Planning:
www.dnr.state.md.us/irc/gia

Montgomery County, Maryland:
www.dnr.state.md.us/greenways/montgomery.html

Palm Beach County, Florida:
www.co.palm-beach.fl.us

Pew Center for Civic Journalism, Straight Talk From Americans - 2000:
www.pewcenter.org/doingcj/research/r_ST2000nat1.htm

President's Council on Sustainable Development:
www.whitehouse.gov/PCSD/

Smart Growth Network:
www.smartgrowth.org

3. Design and plan green infrastructure before development. Because green infrastructure provides the ecological framework for the sustainable use of land, we need to identify and protect critical ecological sites and linkages in advance of the planning and construction of gray infrastructure and the development of land. Wherever possible, due to the high cost of restoration and the difficulty of creating human-made systems that function as well as natural systems, planning and protecting green infrastructure should come first. Where development has already taken place, it is still vitally important to identify where green infrastructure is needed. This will help identify public acquisition priorities or ecological restoration opportunities that will reconnect isolated habitat islands as developed areas become vacant or available.

4. Understand that linkage is key. The desired outcome for all green infrastructure initiatives is a network of green spaces that functions as an ecological whole. For an ecologically viable green infrastructure system, the interconnection of different system components is critical to maintain vital ecological processes and to maintain the health and vitality of wildlife populations. Just as the interstate, state, local, and private roads are designed holistically to create a functional transportation system, we need to design green infrastructure holistically, creating physically connected green space systems through the protection and restoration of vital ecological areas and linkages.

5. Provide an open forum to engage key partners and create a shared green infrastructure vision that excites people with diverse backgrounds and interests. To be successful, green infrastructure initiatives must excite and engage many people. By necessity, these projects need to involve and incorporate the experiences and programs of diverse public, private, and nonprofit partners. It is critical to provide an open forum that brings together key individuals, organizations, and agencies to coordinate and help guide the activities that will make green infrastructure a reality. The numerous functions, values, and benefits of green infrastructure create interest and excitement among diverse people with different backgrounds and issues. It is important to involve participants early in creating a shared vision that reflects their collective hopes and desires and engages them as active participants in ongoing efforts.

6. Design a green infrastructure system that functions across multiple landscapes and scales and is grounded in scientific and land planning theories and practices. Gray infrastructure systems are designed to connect across multiple jurisdictions and incorporate facilities that function at different scales. We need to design green infrastructure systems strategically to connect across urban, suburban, rural, and wilderness landscapes and incorporate green space elements and functions at the state, regional, community, and parcel scales. As our transportation, water, electric, and telecommunication systems are grounded in the theories and practices of diverse professional disciplines, we need to design and plan green infrastructure systems according to the theories and practices of scientific and land planning professions such as conservation biology, landscape ecology, urban and regional planning, landscape architecture, and geography.

7. Engage the public in developing a green infrastructure plan that stimulates action by all participants. A large number of programs already exist in government agencies, non-governmental organizations, and private companies that can help transform a green infrastructure vision into reality. We need to develop strategic plans for green infrastructure that match needed implementation actions to available resources. By doing so we will identify opportunities for individuals, organizations, and agencies to undertake the necessary activities that together will yield desired green infrastructure outcomes. Our state and local governments would never fund and

construct highway systems without a multi-year transportation plan that lays out all the implementation steps in a logical and orderly fashion. State and local transportation agencies even provide for volunteers "to adopt a highway" to help with maintenance. The funding, protection, and management of our green infrastructure systems deserve the same level of detail and foresight.

8. Document and promote the diverse benefits of green infrastructure. Green infrastructure provides many public and private functions and values that address both natural and human needs and benefit the environment and communities. These benefits need to be documented, both in terms of their ecological values for people and the environment and their economic values to society. As all forms of built infrastructure are promoted for the wide range of public and private benefits they provide, we need to promote green infrastructure systems actively for the wide range of essential ecological and social functions, values, and benefits that accrue to people and nature.

These eight green infrastructure principles provide a strategic approach and framework for conservation that can advance the sustainable use of land while providing an interconnected system of green spaces that benefit wildlife and people alike.

Examples of Green Infrastructure Initiatives

Numerous statewide, regional, and local green infrastructure projects exist that embody these guiding principles. Here are some examples.

Florida and Maryland. Both states provide outstanding case studies for the creation of a statewide green infrastructure vision and design that engages and excites diverse individuals, organizations, and agencies.

The Florida Greenways Commission and the Florida Greenways Coordinating Council engaged key public agencies, nonprofit organizations, and private groups in the development of a statewide vision that recognizes the diverse benefits and importance of creating an interconnected greenspace system. These groups also provided oversight and input into the University of Florida's statewide green infrastructure design, which incorporates the theories of conservation biology, landscape ecology, urban and regional planning, landscape architecture, and geography.

The Maryland Greenways Commission facilitated the development of a statewide greenways plan that embodies key green infrastructure concepts and scientific principles. This multi-year effort has lead to the design of a statewide green infrastructure network by the Maryland Department of Natural Resources that is currently being reviewed and incorporated into actions by state programs, local communities, and private groups.

Chicago Wilderness. An excellent example of the incorporation of green infrastructure concepts into a regional conservation initiative, Chicago Wilderness was formed in 1996 as a coalition of 34 organizations to protect, restore, and celebrate the globally important biodiversity of the Chicago region. In September 1999, Chicago Wilderness released its *Biodiversity Recovery Plan*, which provides a shared long-term vision for the greater Chicago region and specific recommended actions for the coalition's more than 90 organizations. The plan's vision includes a network of protected lands and waters as well as habitat greenways that will connect sites and allow for migration between formerly disconnected reserves. Its recommended actions include counteracting the problem of fragmented habitat by building functional connections among habitat islands.

Palm Beach County, Florida. This linked open space network is a fine example of a local, multi-partner initiative to plan and manage a greenspace network that promotes and protects the diverse ecological and social benefits of green infrastructure. The network is a combination of a number of different interrelated conservation and open space efforts. They include the identification of environmentally significant lands and the important conservation greenways/wildlife corridors that connect them; the design of a linked open space network encompassing conservation and recreation components and its incorporation into the goals, objectives, and policies of the county comprehensive plan; and voter approval for $150 million of local funding for the protection of key network lands.

> The Commission's vision for Florida represents a new way of looking at conservation, an approach that emphasizes the interconnectedness of both our natural systems and our common goals and recognizes that the state's "green infrastructure" is just as important to conserve and manage as our built infrastructure. . . . We believe the recommendations in our report offer Florida an incredible opportunity to create a statewide greenways system that connects fragmented or isolated elements of the state's green infrastructure, and that connects people with their natural, historic and cultural heritage. . . . A healthy and diverse green infrastructure is the underlying basis of our state's sustainable future.
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> *Florida Greenways Commission, December 1994.*

Montgomery County, Maryland. This county's award winning stream valley park system is an excellent example of planning for green infrastructure before development occurs. Montgomery County is Maryland's most populous, with more than 800,000 residents. It started buying land along all of its major stream corridors in the 1940s and 1950s before land development made it impossible to preserve these ecologically important areas. However, the county is not resting on its laurels. It recently approved a $100 million Legacy Open Space Program to preserve the "best of what is left" of the county's urban and rural open spaces.

Conclusion

Green infrastructure provides a strategic smart approach to land conservation that benefits people, wildlife, and the environment. It helps us look at the pieces of the land conservation/land development puzzle together, addressing the interrelationships and interactions between humans and the natural world. Green infrastructure elevates green space from "nice to have" to "must have." It provides a critical link between smart conservation and smart growth and in doing so serves as a fundamental building block for sustainable use of land that is good for our environment, good for our economy, and good for our communities.

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